

REMARKS

Claims 1-13, 15-17, and 19-30 are pending in the application. Claims 1-10, 12-13, 16-17, 20-28, and 30 have been amended. Further, claims 14 and 18 have been previously cancelled. No new matter has been introduced by the amendment.

Claims 2-10, 12-13, 17, and 20-27 have been amended to improve their form by changing the definite article "said" to "the." The amendment of these claims does not alter their scope and merely renders the claim language consistent throughout the applicants' pending claims.

Rejection Under 35 U.S.C. §103 (a)

Claims 1-13, 15-17, and 19-30 have been rejected over Kellar et al. in view of Suga. This rejection is overcome in view of the amendment of claims 1 and 16, together with following remarks.

Claim 1, as amended, recites a method of fabricating a die containing an integrated circuit comprising active components and passive components. At least a part of the passive components comprise critical passive components. The method includes producing a first substrate including a least one active component. The first substrate is heated at a temperature lower than a first temperature above which the first substrate is an acceptable he degraded. A second substrate is produced that includes critical passive components. The second substrate is heated at a temperature higher than the first temperature. The first and second substrates are bonded, where the bonding process comprises performing a layer transfer. After bonding the first and second substrates, at least one interconnection line is produce between the components of the first and second substrates. The interconnection line passes through the second substrate. The applicants assert that the combination of cited references fails to suggest or disclose the method recited by claim 1.

With respect to the previous version of claim 1, the instant amendment removes a portion of the claim language from the preamble and positively recites the relationship between the processing temperatures of the first and second substrates. Further, the nomenclature used to describe the relative temperatures has been changed to clarify

that the processing temperatures of the first and second substrates differ with respect to the recited "first temperature." Within the context of claim 1, the first temperature is a temperature that defines thermal processing conditions that lead to degradation of the first substrate. Accordingly, claim 1 recites a method in which first and second substrates are processed under different temperature conditions in view of the presence of critical passive components on the second of the two substrates. After the substrates are bonded, an interconnection line is produced that passes through the second substrate. The applicants assert that the recited process is not suggested or disclosed, inherently or otherwise by the cited references, alone or in combination.

Regarding the Examiner's remarks pertaining to the claim terminology "critical passive components," at page 4 of the instant Office Action, the applicants point out that the word "critical" relates to a difference in thermal sensitivity of certain passive components, as opposed to other passive components and active components. The word "critical" is used only to distinguish the *critical* passive components that require for their production a temperature higher than the first temperature above which the active components (or the corresponding substrate) are degraded, from *non-critical* passive components that require for their production a temperature lower than the first temperature. (See, for example, Substitute Specification, pg. 6, ll. 13-17).

The examiner acknowledges that Kellar et al. and Suga fail to disclose critical passive components and the need for different processing temperatures in view of an acceptable degradation of active components. (Office Action, pg. 4). Despite the failure of these references to disclose different thermal processing conditions in consideration of the thermal sensitivity of components provided with the substrates, the Examiner nevertheless asserts that Suga discloses "only critical passive components." The Examiner further asserts that Suga inherently discloses a higher processing temperature than a temperature above which active components are unexpectedly degraded. The applicants respectfully disagree that Suga discloses only critical passive components, and that Suga inherently discloses different processing conditions. Accordingly, a *prima facie* case of obviousness is not established by the combination Kellar et al. and Suga.

As previously asserted by the applicants, Suga fails to make any distinction between substrates with critical passive components and active components that will degrade under high temperature processing. (Response, February 26, 2010, pg. 8). Further, Kellar et al. disclose that wafer #2 (120) includes one or more memory devices. (Col. 3, ll. 21- 22). The applicants assert that one skilled in the art would not understand Suga to disclose critical passive components that require processing temperatures higher than active components or other passive components.

The applicants further note that Suga discloses semiconductor elements, such as transistors and capacitors, that are built on a second portion (200) of the substrate (1). (Col.5, ll. 10-12). Suga also discloses that transistors and capacitors are built on the first portion (100) of the substrate (1). (Col. 4, ll. 57- 58). Accordingly, the Examiner's assertion is incorrect that Suga discloses a substrate "comprising only critical passive components". The applicants further assert that neither Kellar et al. nor Suga inherently disclose the process recited by claim 1. There is no suggestion of any consideration to thermal processing conditions in view of one of two bonded substrates containing critical passive components and the other active components. The applicants assert that the MPEP sets forth criteria to establish inherency. Namely, the missing descriptive matter must necessarily be present in the subject matter of a cited reference.

"The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art); *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.' " *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted) (The claims were drawn to a disposable

diaper having three fastening elements. The reference disclosed two fastening elements that could perform the same function as the three fastening elements in the claims. The court construed the claims to require three separate elements and held that the reference did not disclose a separate third fastening element, either expressly or inherently.)." (MPEP §2112 IV).

The applicants assert that in order for Suga, for example, to inherently disclose the process recited by the applicants' claim 1, at least one of the substrates would certainly have to be processed at a higher temperature than the other. There is, however, no explicit teaching of such process conditions. Accordingly, Suga does not inherently disclose a process in which first and second substrates are processed at two separate thermal conditions, as defined by active component degradation, followed by bonding of the substrates and interconnect formation.

The applicants further note that Kellar et al. does not disclose a layer transfer in FIG. 1b, as alleged at page 3 of the instant Office Action. The layer transfer is described in the applicants' specification. (Substitute Specification at page 12, ll. 30-32 and page 13, ll. 1-11).

Claims 2-13, 15, and 28-30 depend directly or indirectly upon claim 1. These claims distinguish over the cited references at least in view of the amendment and remarks pertaining to claim 1. Further, claim 28 has been amended to maintain consistency with the amendment of claim 1. Also, claim 30 has been amended to recite that the at least one active component comprise an interconnect metal that is degraded at or above the first temperature.

Claim 16, as amended, recites a die made of a single stack of layers, containing an integrated circuit including active components produced at a temperature lower than a first temperature above which the active components are unacceptably degraded and comprising passive components. At least a part of the passive components include critical passive components produced at a temperature higher than the first temperature above which the active components are unacceptably degraded. The die includes an interface between two of the layers, such that a first portion of the die situated on one side of the interface includes the active component and a second portion of the die

situated on the other side of the interface includes the critical passive components produced at the temperature higher than the first temperature. The die also includes at least one interconnection line between the components of the first and second portions, where the interconnection line passes through the second portion of the die.

As asserted above, neither Kellar et al. nor Suga suggest or disclose formation of bonded substrates in which thermal processing conditions are determined by the presence of critical passive components and active components. The applicants further assert that neither Kellar et al. nor Suga suggest or disclose a die having an interface as recited by claim 16.

Claims 17, 19-26 depend directly or indirectly upon claim 16. These claims are allowable least in view of the amendment and remarks pertaining to claim 16.

The applicants assert that their amendments recast the subject matter previously presented. In view of the nature of the amendments, a new search should not be necessary. Accordingly, the applicants respectfully request that the Examiner enter and consider the amendment.

The applicants have made novel and non-obvious contribution to the art of integrated circuits including active and passive components, and to their fabrication. The claims at issue are distinguished over the cited references and are in condition for allowance. Accordingly, such allowance is now earnestly requested.

Respectfully submitted,

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